

# Lessons from the Ashes: Improving Transportation Safety Through Accident Investigation



**Presentation to Civil Air Patrol  
Delta Composite Squadron**

Robert Sumwalt  
June 23, 2020



Our mission:  
Prevent Accidents  
Reduce Injuries  
Save Lives





# The Board



Michael Graham



Bruce Landsberg



Robert Sumwalt



Jennifer Homendy



Thomas Chapman









# NTSB Response Operations Center



# Situation Room







# Enroute





# Arrival on Scene



# Boots on the Ground

- Powerplants
- Structures
- Systems
- Operations
- Human performance
- Survival factors
- Airworthiness
- ATC
- Meteorology
- Recorders
- Transportation Disaster Assistance











# Drones



# Data Accuracy



Left tire impact < 1" variance  
from ground measurement



Prop slash marks less  
than 0.1" variance

Wing from runway edge –  
ground measurement and  
ortho equal at 83'4"

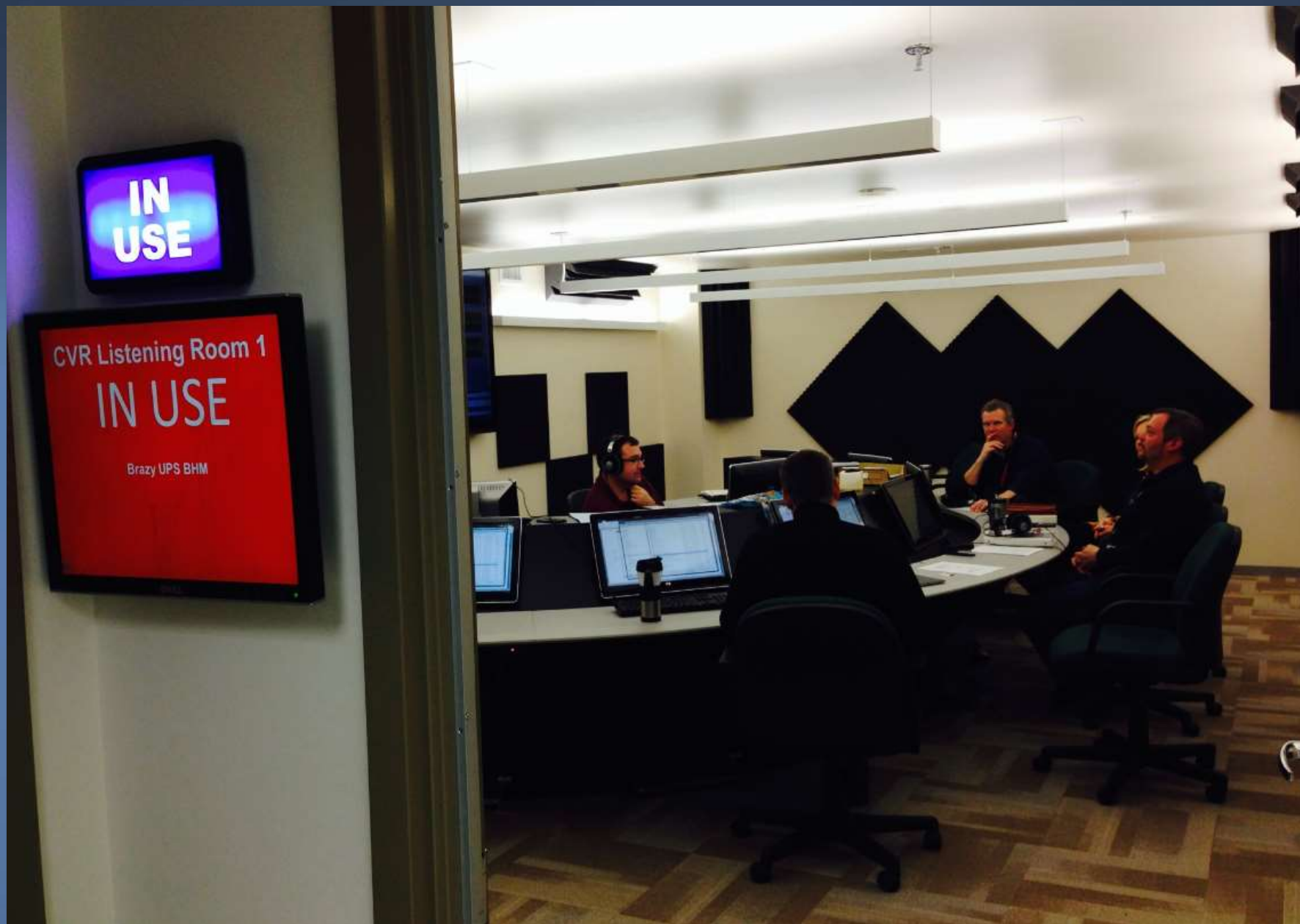














15:26:10

**HOT-1** climb set.

15:26:16

**HOT-2** and flaps one please.

15:26:17

**HOT-1** flaps one.

15:26:37

**HOT-1** uh what a view of the Hudson today.

15:26:42

**HOT-2** yeah.

15:26:52

**HOT-2** flaps up please, after takeoff checklist.

15:26:54

**HOT-1** flaps up.

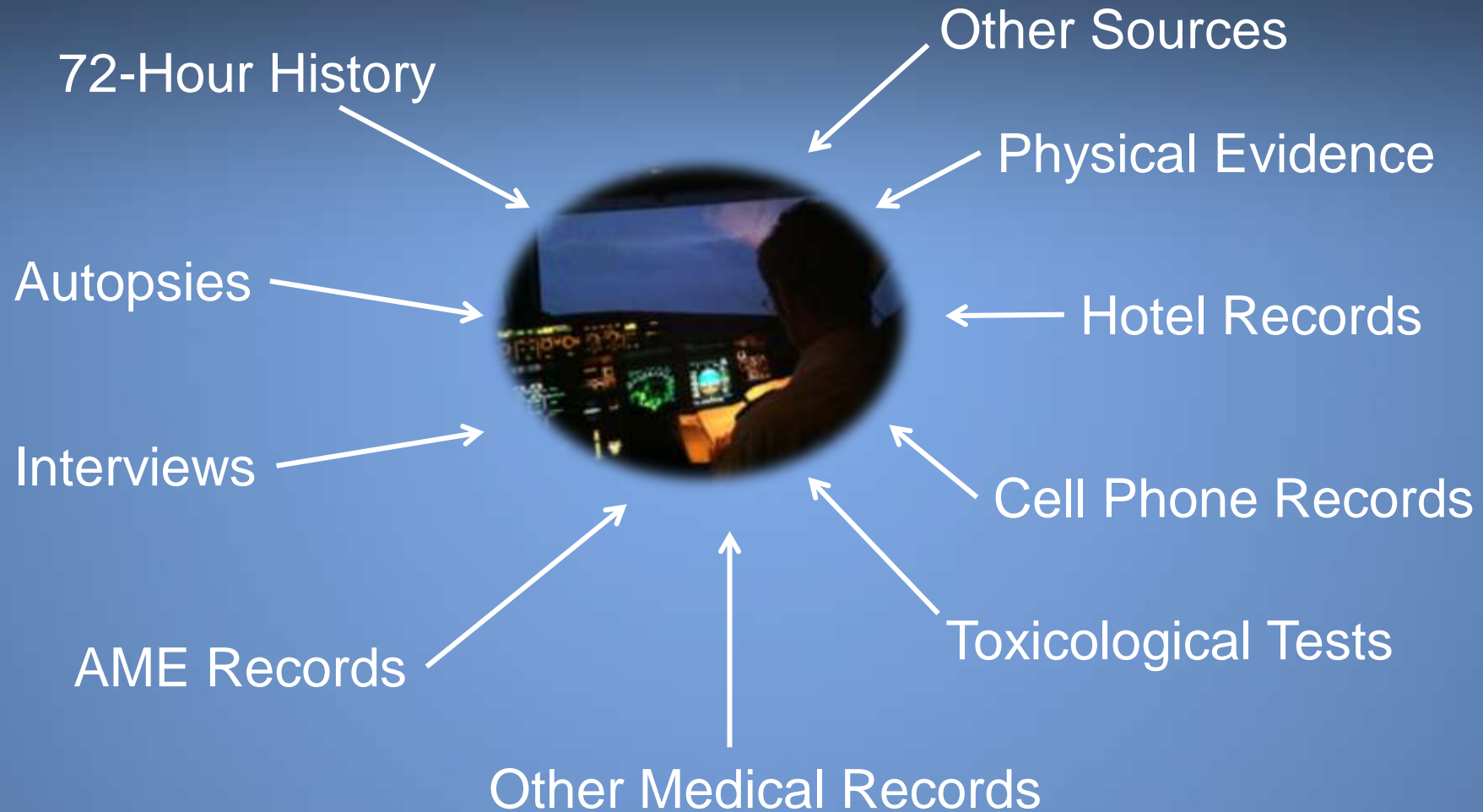


Human factors is a multidisciplinary science that examines the relationship between humans and the systems with which they interact, including...

Ergonomics  
Engineering  
Psychosocial interactions  
Decision-making  
Fatigue  
TEM  
Psychology  
Physiology  
Human-centered design  
Information processing  
Biomechanics  
National cultural influences  
Medicine  
Study of organizational issues  
Anthropometrics  
CRM  
Resilience engineering  
Automation management  
Communications



# Potential Sources of Information



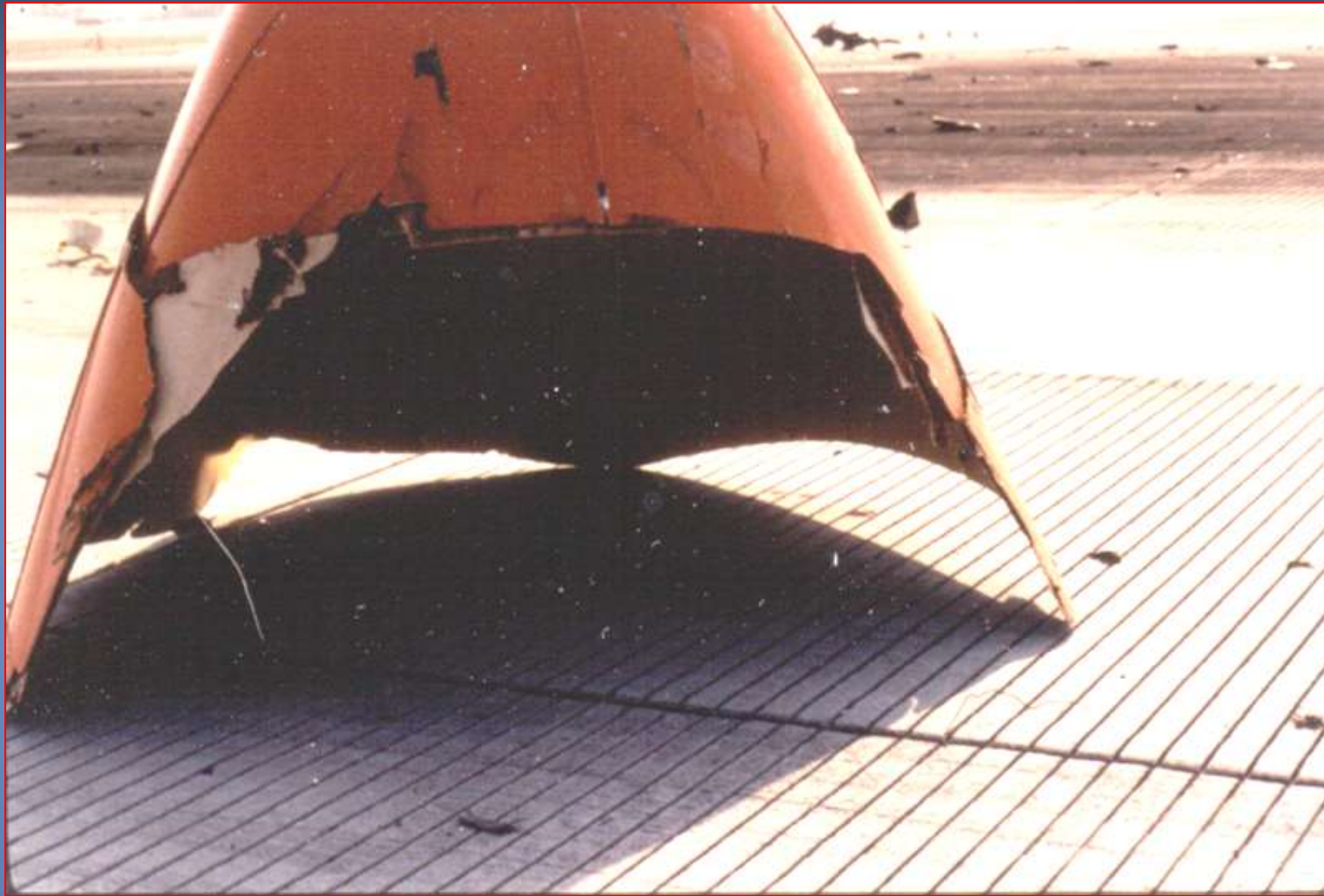
Time	Cell phone activity
0808	Phone call - outgoing
0813	Phone call - outgoing
0902	Phone call - outgoing
1002	Text message - outgoing
1005	Text message - outgoing
1016	Text message - outgoing
1121	Text message - outgoing
1138	Phone call - outgoing
1234	Phone call - outgoing
1251	Phone call - outgoing
1300	Phone call - outgoing
1315	Phone call - outgoing
1317	Phone call - outgoing
1324	Phone call - outgoing
1330	Phone call - outgoing
1332	Phone call - outgoing
1404	Text message - outgoing
1432	Phone call - outgoing
1501	Phone call - outgoing
1503	Phone call - outgoing
1642	Phone call - outgoing





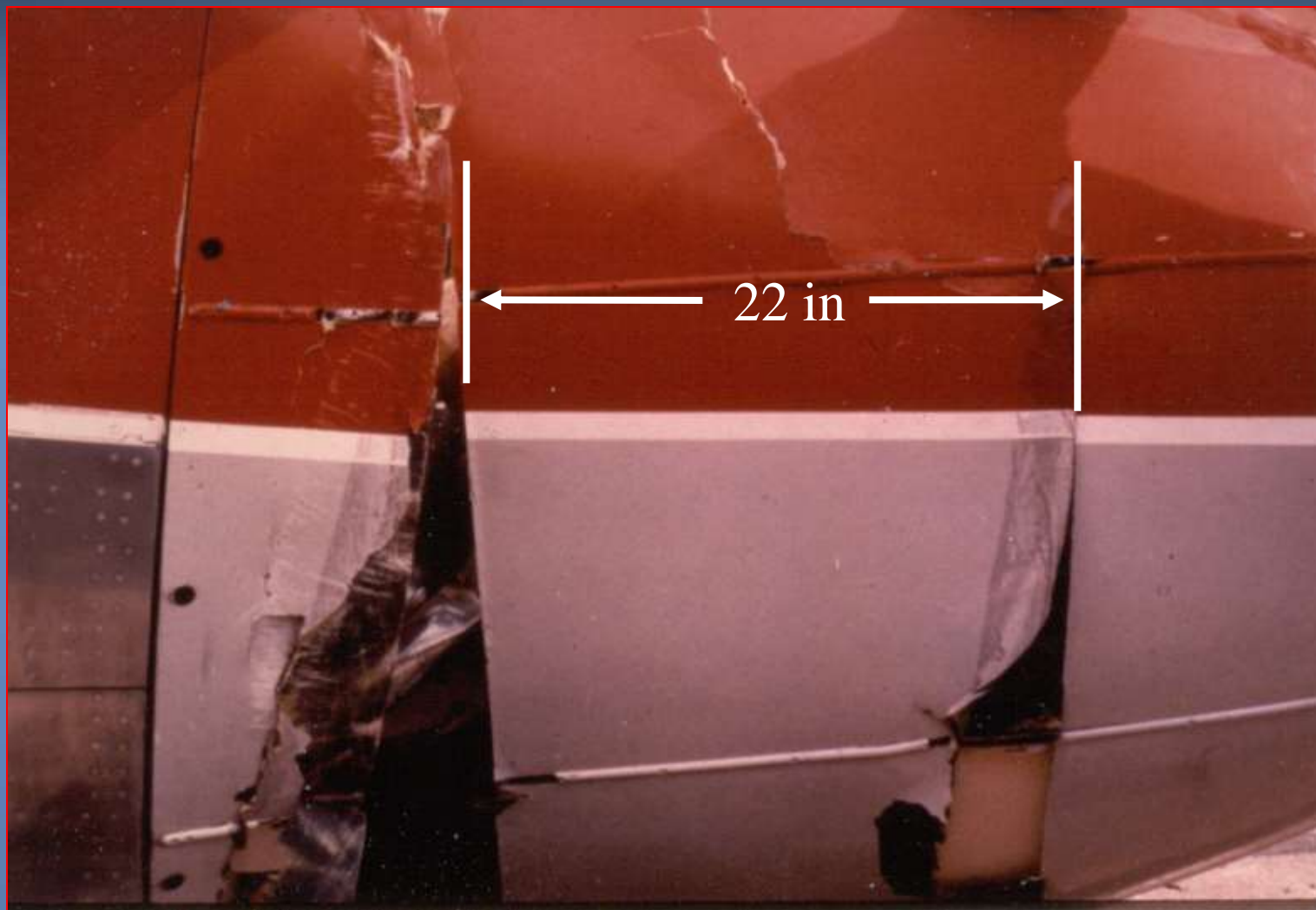












$$\text{SPEED} = \text{DISTANCE} / \text{TIME}$$

$$\text{DISTANCE} = \underline{22} \text{ in} / 12 = \underline{1.833} \text{ ft}$$

$$\text{PROP SPEED} = \underline{1543} \text{ rpm} / 60 = \underline{25.7} \text{ rps}$$

$$\text{BLADES/SEC} = \# \text{ OF BLADES} \times \text{PROPSPEED}$$

$$= \underline{4} \text{ BLADES} \times \underline{25.7} \text{ rps} = \underline{102.9} \text{ bps}$$

$$\text{TIME} = 1 / \text{bps} = 1 / \underline{102.9} \text{ bps} = \underline{.00972} \text{ sec/blade}$$

$$\text{SPEED} = \text{DISTANCE} / \text{TIME} = \underline{1.833} \text{ ft} / \underline{.00972} \text{ sec}$$

$$\text{SPEED} = \underline{189} \text{ fps} = \underline{112} \text{ knots}$$





DVR 1-CH2



2006-09-28 10:00



NTSB

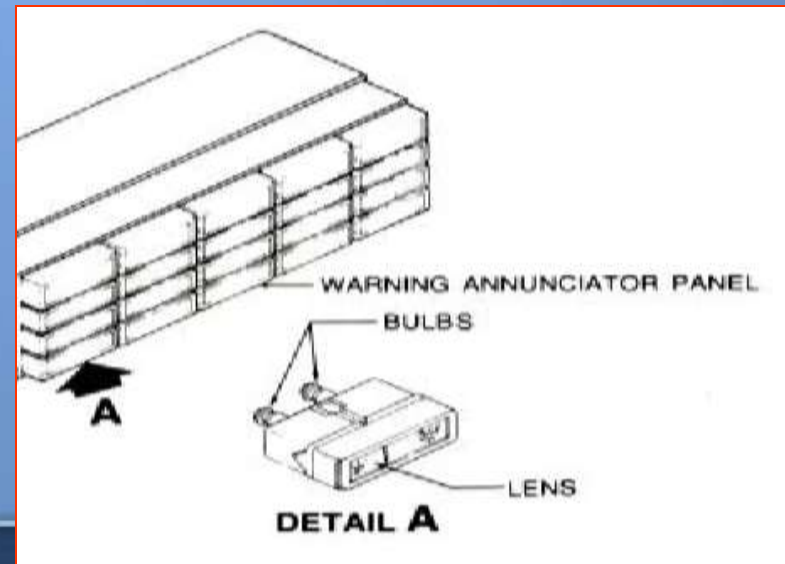
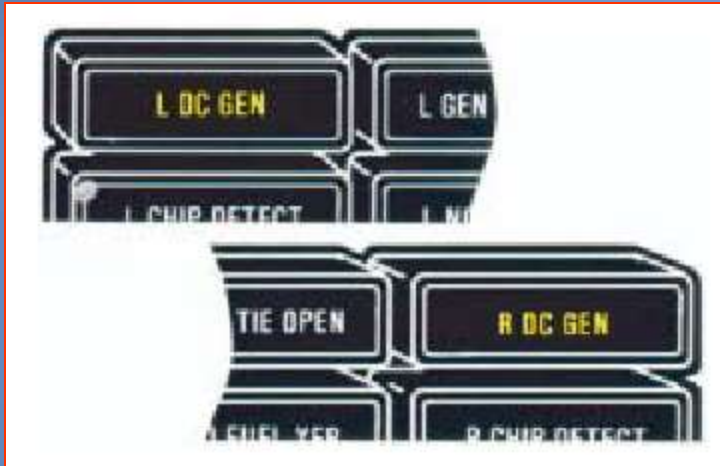


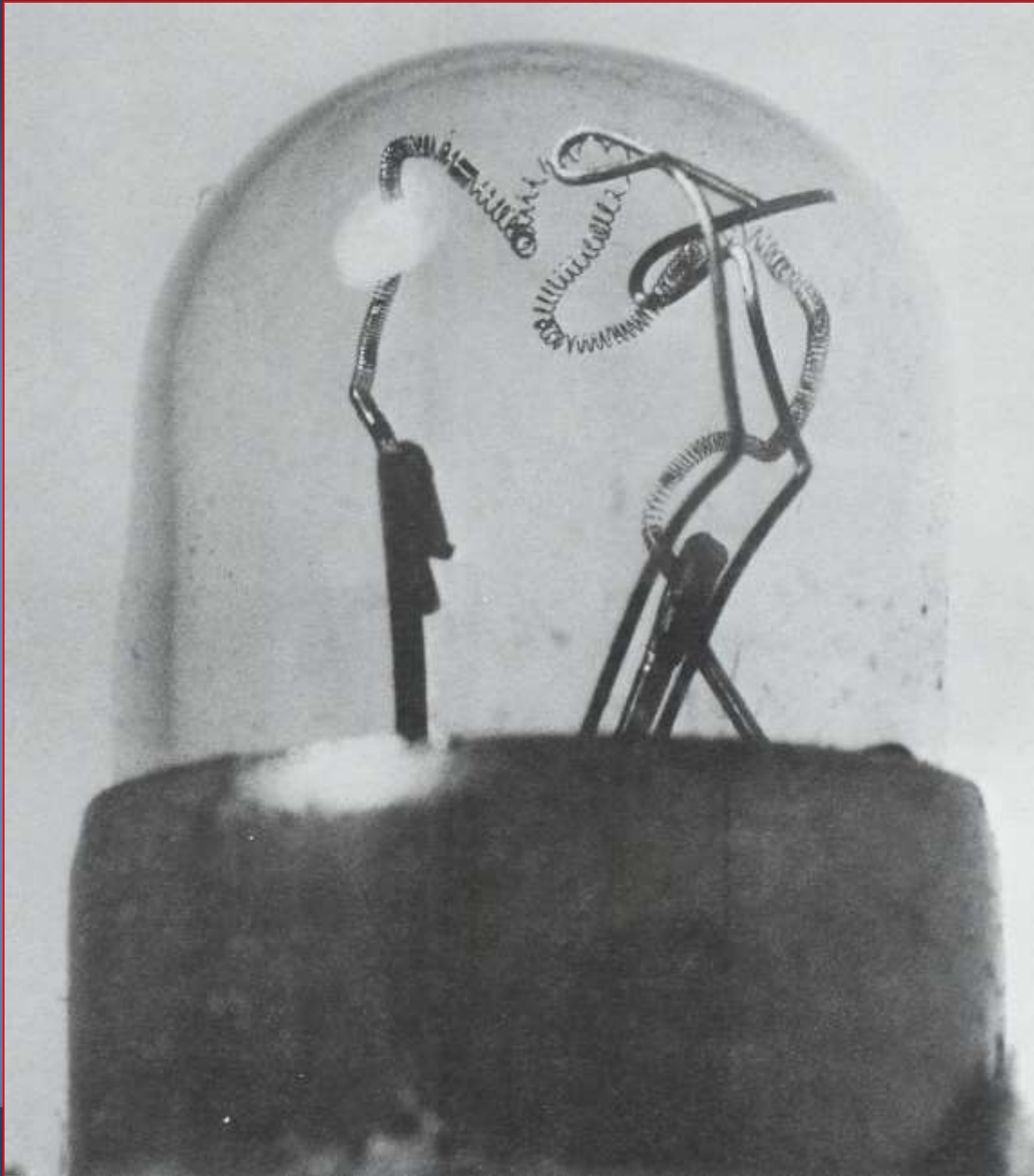


NTSB



# Light Bulb Filaments





Was this light  
illuminated at impact?







Graphic by NTSB

## NTSB News

The National Transportation Safety Board opened the public docket as part of its ongoing investigation of the fatal, Jan. 26, 2020, helicopter crash near Calabasas, California.

Read More

1 2 3 4 5

Accident Dockets

Safety Recommendations

Aviation Accident Database

Data & Stats

Training Center



# NTSB

An Independent  
United States Federal  
Government Agency

## NTSB Response Operations Center

To report an incident/accident or if you are a public safety agency, please call  
1-844-373-9922 or 202-314-6290 to speak to a Watch Officer at the NTSB  
Response Operations Center (ROC) in Washington, DC (24/7).

News @ NTSB



Charged with determining the probable

## Other Ways to Contact NTSB



NTSB.gov



NTSB





# National Transportation Safety Board